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ABSTRACT

The final report describes the Charlotte Circle Project, an early intervention demonstration project operated from 1985-1988 in Charlotte, North Carolina. The report examines the project's model, the participating children and families, and evaluative findings regarding its implementation, outcome, and impact. The project served 25 children with a mean age of 18.9 months. All children exhibited severe disabilities. Project outcome data indicated significant gains of almost double the expected developmental rate for Project students including gains in specific skills, gains in developmental age, and gains in developmental quotient. In addition, 56% of the children exiting the project enrolled in more normalized (less restrictive) educational placements. The outcomes also support the center-based approach of the Project and the social reciprocity model emphasizing parent child interactions. Results suggest that the net savings to society may be as much as $138,000 per child when such severely handicapped children are subsequently able to be placed in less restrictive educational settings. (DB)

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FINAL REPORT
CHARLOTTE CIRCLE PROJECT

1985 - 1988

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CHARLOTTE CIRCLE PROJECT

GOALS AND MODEL

The Charlotte Circle Project was an early intervention demonstration project funded by the Handicapped Children's Early Education Program, Office of Special Education Programs, U.S. Department of Education. The Project was operated from 1985 - 1988 by the Department of Curriculum and Instruction, College of Education and Allied Professions, of the University of North Carolina at Charlotte in collaboration with St. Mark's Center, Inc., a private, nonprofit agency providing educational and therapeutic services to individuals with developmental disabilities in Mecklenburg County, North Carolina. This report describes the Charlotte Circle Project's model, the participating children and families, and evaluative findings regarding its implementation, outcome, and impact.

Importance

Early intervention has been described as a "critical investment in the future of mentally retarded children" (Rogers-Warren & Poulson, 1984), and yet the younger the child and the more severe the handicap, the less likely is the probability of accessible and appropriate intervention. Hayden (1979) noted that the service gaps are most dramatic for infants and children under 3 and the quality of services varies most widely for this group. The service gap for this group of young children with severe disabilities can be attributed to many factors including the low incidence of these types of developmental disabilities, questions about the usefulness of intervention for children with severe impairments, and the lack of readily accessible

effective intervention strategies (Calhoun & Rose, 1988a). Fortunately, this service gap is being addressed by the U. S. Department of Education through the establishment of an HCEEP model demonstration priority for programs for infants with severe/profound handicapping conditions and by the passage of PL 99-457, which encourages the establishment of services for handicapped preschoolers, including this group of traditionally un- or underserved young children. As new programs begin, the critical question will be: What are the effective, efficient, appropriate interventions for this special population?

The principle of normalization provides important guidance when attempts are made to determine the most appropriate and helpful interventions for young children with severe disabilities (Calhoun, Rose, Prendergast, & Spooner, 1986). Nirje (1969) described normalization as "making available to the mentally retarded patterns and conditions of everyday life which are as close as possible to the norms and patterns of the mainstream of society" (p. 181). Normalized interventions for very young children with severe disabilities must take into account typical activities of children under three years of age and typical demands that occur in the child's natural domestic and community environments.

For children under the age of three, interactions with parents and other caregivers are central to the child's development (Barrera & Rosenbaum, 1986). The age-appropriate "work" for very young children is to establish a satisfying relationship with caregivers. This relationship will lead to increased stimulation, attention, and support. The behavior of the child will affect the behavior of the

parent which, in turn, affects the behavior of the child. The parent's response serves an an antecedent prompt for the child's response, which then serves dually as a consequence for the previous parent behavior and as a prompt for the parent's subsequent response, which serves as a consequent for the child's previous behavior (either reinforcing or punishing). This latter parent response may serve as a prompt for further child behavior or as a prompt for another parent behavior that may serve as a prompt for another child behavior. This circular, reciprocal pattern of interactions, a "stream" of behavior (Delprato, 1986; Schoenfeld, 1972), may be interrupted at any point by dysfunctional responses. If, for example, the child's response is not reinforcing to the parent for a given "approach" or "interaction initiation" response, then we may expect those parental responses to decrease, both in terms of frequency and quality. Interventions that acknowledge and focus on the reciprocal and circular nature of parent-child interactions can be called "social reciprocity interventions" (Bell, 1974).

Apparently, social reciprocity interventions can be important for young children with severe disabilities and their parents. A review of observational studies of the interactions between parents and their babies who are disabled reveals atypical parent-child interactions. Several investigations focusing on the interactions of mother-child dyads have suggested that mothers of young children with mental retardation initiate fewer interactions and are less likely to respond positively to their children than are mothers of non-handicapped developmentally matched children (Crawley & Spiker, 1983; Cunningham, Reuler, Blackwell, & Deck, 1981; Levy-Shiff, 1986). In these same

studies, children with mental retardation were found to be less responsive: they laughed, smiled, socialized, spoke to and moved toward their parents less often than did non-handicapped children.

The reciprocal nature of parent-child interactions may be disrupted or distorted as a function of certain characteristics associated with severe or profound disabilities, including (a) non-responsiveness - the child's inability to "take in", to thrive and to feel comfort; (b) atypical motor responses; and (c) atypical daily living needs (Ramey, Beckman-Bell, & Gowen, 1980). For example, a parent's efforts to cuddle her infant with severe motor problems may be met with body extension and retraction instead of the expected molding to her body (Langley, 1980). Such behavior may cause a parent to feel rejected by the infant, or it may seem that the child is expressing physical discomfort. Over a long-term, a parent may feel ineffective as a caregiver, which further complicates and impedes positive interaction with the child.

Interventions that focus on social reciprocity would seem to hold promise both for children with severe disabilities and their families. Parents need to feel competent about handling their children, to feel effective in meeting their child's needs, to feel love and affection, and to observe positive changes in return for their caregiving. Their interactive behaviors require reinforcement, available usually from their child. Their child's atypical responses may inhibit the development of these parental feelings and interactive behaviors because many expected, typical reinforcers are not available. The child, on the other hand, needs a nurturing environment with activities that facilitate development; paradoxically, many of these

activities occur in an interactive relationship which the child's behavior may inhibit because of its lack of reinforcing power for the parent's interactions. Intervention to enhance socially reciprocal interactions would seem, then, to be mutually beneficial.

In addition to curriculum needs, service delivery models for this special population must be considered. Services for babies with severe disabilities are typically categorized as home-based (a therapist makes periodic visits to the home to instruct the parents in developmental activities), center-based (a more school-like classroom setting), or consultative (special support for infants and families as they participate in normalized community programs). While all of these service delivery models offer helpful services, recent research underscores the desirability of flexible programming within a continuum of services (Kjerland, 1986). A recent study of parents' concerns about early intervention, parents' reactions to features of different service delivery models and the variation in the length of time parents needed to make an enrollment decision suggested the importance of flexibility in providing early intervention services (Calhoun, Calhoun, & Rose, in press). The "goodness-of-fit" concept (Kern, 1984; Simeonsson, Bailey, Huntington, & Comfort, 1986) seems useful in considering the unique idiosyncratic characteristics of child and family as they interact with the demands, expectations, and/or opportunities occurring in the environment. The goodness-of-fit concept theorizes that the optimal characteristics of the family or the ideal environmental conditions cannot be independently delineated. Rather, the idea of goodness-of-fit involves the orderly interaction of the developing family and progressive demands of the

environment. In order to increase families' comfort with early intervention decisions, respect and attention to family concerns is essential. Flexible programming alternative that are responsive to current family needs seem essential to optimal programming for the birth-three goodness-of-fit include: (a) allowing ample time for parents to make enrollment decisions, including observations of the program, return visits before enrollment, and consultation with other parents; (b) inviting parents to participate in the design of their child's program, including the days and hours of the child's attendance; and (c) allowing for trial or short-term participation, including such options as fewer hours per day or fewer days per week (Calhoun, et al., in press).

Project Goals

The Charlotte Circle Project was supported by current research that emphasizes changing the child's and caregiver's vulnerability to environmental effects and enhancing the quality of interaction between children with handicaps and their caregivers (Calhoun & Rose, 1988b; MacDonald & Gillette, 1984; Mahoney, Powell, & Finger, 1987; McCollum, 1987; Snell, 1987). As noted by Sandall (1987), within the past few years, researchers have increased their focus on the examination of intervention strategies which may have a positive effect on parent-infant interaction when the infant is handicapped. These strategies focus on a variety of aspects, including interactive coaching, turn-taking, and guided interventions, as well as social reciprocity interventions.

The Charlotte Circle Project, in its three years as an HCEEP Model Demonstration Project (ending June 30, 1988), applied these

interaction efforts to the targeted population of infants and young children with severe/profound handicaps. The severity of handicaps and the concomitant functional problems, such as non-responsiveness, non-vocal behavior, increased irritability, a lack of imitation responses, increased health crisis, increased need for special procedures such as tube feeding and suctioning, and atypical motor responses have presented special challenges to normalized infant-caregiver interactions. While most interaction intervention research has focused on modifying the adult's behavior (Sandall, 1987), the Charlotte Circle Project has developed interventions that focus on children's behavior as well as adults in an effort to strengthen the reciprocal nature of mutually satisfying social interactions. In general terms, social reciprocity goals for children have included:

- Children will increase their social responsiveness to primary caregivers. Increased responsiveness includes, but is not limited to, sustained eye contact, smiling, orienting to parents, verbal responses, imitative responses, and more normalized responses to voice and touch.
- Children will reduce the frequency and duration of behaviors parent identify as stressful, aversive, and unpleasant. These behaviors include, but are not limited to, prolonged crying, vomiting, drooling, self-injury, self-stimulation, and disengagement.

Social reciprocity goals for caregivers have included:

- Parents will participate with their children in mutually satisfying social interactions.

- Parents will demonstrate and express increased competence in meeting the daily needs of their child, including health care, feeding, bathing, dressing, handling, and comforting.
- Parents will report and demonstrate an increasingly normalized family life.
- Parents will increase their social responsiveness to their child. Increased responsiveness includes, but is not limited to, differential responses to appropriate and inappropriate child responses, turn taking in interactions, smiling, verbal responses, and imitative responses .

Charlotte Circle Project Model

The Charlotte Circle Project, funded as an HCEEP Model Demonstration Project (1985-1988) has been innovative in its target population (severely involved, very young children and their families) and its intervention focus (promoting child development through stimulation of and training in socially reciprocal interaction). A service delivery model has been developed that includes both center-based and home-based components, with respect and encouragement for family participation in program selection, design, and implementation. Each of these innovative features will be described below.

Child Characteristics. The Project's students were those identified as the most severely handicapped within the birth to 3-year age range in Mecklenburg County. The following definition of severe handicaps was used by the Circle Project:

> Functions in the severe range of mental retardation (at least 4 standard deviations below the mean on a particular developmental or cognitive test; general scores > 40)

or

> exhibits severe functional difficulties or complex and multiple sensorimotor disabilities that, without intervention, place the child at risk for severe retardation or developmental delays.

The children enrolled in the Circle Project classroom were those that suffered from the most debilitating physical, sensorimotor, or mental handicaps, typically involving combinations of handicapping conditions. In the not too distant past, these children would perhaps be too medically fragile to survive or, if they did survive, would have probably been institutionalized at a very early age. More detailed descriptions of the participants are presented in the Population Description section below.

As a result of the Circle Project's focus on this special population, care routines and procedures were developed to deal with some challenging aspects of serving medically fragile children with complex disabilities. Among the special routines and procedures developed include health and hygiene protocols (i.e., herpes, CMV); training staff to use special procedures such as the feeding and ways to increase the social aspects of special routines; and transportation services that reflect best professional practice.

Intervention Focus. The major emphasis of the Circle Project was to enhance the relationship between parents and their young children with severe disabilities by increasing the child's social responsiveness, reducing the frequency of stressful behaviors, and promoting the acquisition of developmental skills. The Circle Project was based on the theory that the behaviors of children affect the behavior of parents whose behavior, in turn, affects the behavior of

their children. This is called the Social Reciprocity Model.

Service Delivery. The Charlotte Circle Project was developed a classroom-based/home-based model of service delivery for young children with severe handicaps and their families. Figures 1, 2, and 3 illustrate the service delivery model.

In the center-based component, classroom instruction occurred from 9 am to 1 pm daily. Parents could choose to enroll their children three days per week or five days per week, with optional extended hours for day care. Transportation was provided for families who needed this service. Services were provided on a 12-month basis. The classroom component provided intensive early education services, while serving as a laboratory for the development of effective social reciprocity interventions for each child in the program. Additionally, the classroom component provided respite hours for parents.

Curriculum resources for the center-based component included the Charlotte Circle Curriculum Guide, the Infant Massage Program (available for UCP of Denver, CO), and a British music therapy program, Body Awareness, Communication, Contact. Classroom activities included using lights and music to cue activities and add rhythmicity to the day; massage; music therapy; individual work on social reciprocity objectives; sensory stimulation; integrated language and motor therapy; and therapeutic feeding programs.

The classroom staff included two special education teachers, one certified occupational therapy assistant, and one paraprofessional. Community volunteers and university students provided important instructional assistance. Consultation services from speech therapy,

occupational therapy, family services, and pediatrics strengthened the programs for each child.

In the Home-based/Family Services Component the monthly home visits were scheduled for each family in the program. The purposes of the home visits were for joint planning of children's goals, sharing of information with important people in the child's life (including grandparents, siblings, and babysitters), and to provide instruction and support in areas of need as identified by the parents. The Parents' Help Wanted Questionnaire (available from the D.C. Society for Crippled Children) was used to facilitate establishing the agenda for each home visit. Additionally, a family-centered assessment plan invited and encouraged families to take a central role in identifying goals and establishing an intervention plan.

Other family services included quarterly Family Night programs, with covered dish supper and childcare provided. All family members, including siblings, were invited. After a group meal, parents met with a facilitator on a special topic, while a recreational program was provided for children. Topics included "Handling Tough Times and Tough Situations", a demonstration workshop on infant massage techniques, and a workshop on making use of community resources (such as libraries, swimming pools, restaurants, and museums).

Special parent-child days were held in the Circle Project's classroom. These were usually centered around holiday themes (e.g., face-painting at Halloween). These normalized celebrations became very important support for normalized family life.

Parents were invited to visit the Circle Project's class at anytime, with or without an appointment. They could stay with their

children as long as they wished. They could also choose to observe the demonstration class through a one-way mirror from an observation room.

As children approached their third birthday, transition services were provided by the Circle Project's staff. Exit evaluations were conducted and families were assisted in identifying and using the next appropriate, least restrictive program for their children. Staff consultations were used to assist in the transition. Furthermore, families were consistently encouraged to participate in community programs and were supported in integration activities for their children with non-handicapped age-peers. Examples of these activities included, participation in a "Mother's Morning Out" program, nursery for a bowling league, and afternoon day care in a regular daycare program.

POPULATION DESCRIPTION

The Charlotte Circle Project is located in Charlotte, North Carolina with service responsibilities to Mecklenburg County, an area of approximately 500,000 population.

Twenty-eight families were referred to the Project over the three years of HCEEP funding. For purposes of this report, only descriptive data for the 25 parents whose children were enrolled for any period of time and their children will be presented. Performance data will be reported for only the 19 children enrolled by the Project for a period of time necessary to attain two assessments, typically at least 3 months.

Descriptions of Parents

Of the 25 families, 64% were two-parent families, 20% were divorced or separated and headed by single mothers, 8% were single, not married parents with half being female and the other half male, and 8% were foster parents. Racial/ethnic composition indicated that 60% were white, 36% were black, and 4% were Asian.

Age. As may be seen in Table 1, most mothers were from 20 to 25 or 31 to 35 years old when their child was enrolled in the Charlotte Circle Project. Mother's mean age at the time of enrollment was 28 years. Fathers tended to be slightly older, with most fathers in the 31 to 35 year-old age range, with a mean age at time of enrollment of 33.1 years.

Table 1

Distribution of Parents' Ages

	20-25	26-30	31-35	36-40	41-46
Mother's Age (n=18)	33%	28%	33%	6%	-
Father's Age (n=15)	13%	13%	47%	20%	7%

Education. Of the 16 mothers for whom educational information was self-reported, all had completed at least high school, while 29% of the 14 fathers had not. On the other hand, 50% of the fathers had at least one year of college, while 37% of the mothers had pursued their education past the high school level. Table 2 presents the highest grade level attained by the reporting Project parents.

Table 2

Parents' Highest Grade Completed

	<12	=12	13-14	15-16	16+
Mother (n=16)	0	53%	19%	13%	6%
Father (n=14)	29%	21%	29%	7%	14%

Occupation. Parent occupations were classified according to categories used by the U. S. Bureau of Census. As may be seen in Table 3, most mothers were homemakers; most fathers were employed in either managerial or professional specialty occupations or as operators, fabricators, or laborers.

Table 3

Occupation Categories

	Unemployed*	1	2	3	4	5	Homemaker
Mothers (n=23)	13%	17%	17%	22%	0	4%	26%
Fathers (n=21)	14%	24%	14%	5%	19%	24%	0

* Includes one mother and one father who were in prison.

KEY to Occupation Classifications (U.S. Bureau of Census, 1980)

1 = Managerial and professional specialty occupations

2 = Technical, sales, and administrative support

3 = Service occupations

4 = Precision production, craft, and repair

5 = Operators, fabricators, and laborers

Descriptions of Children

As described above, the children who participated in the Charlotte Circle Project were those children aged birth to 3 years who demonstrated the most severe disabilities or who were at risk for severe retardation or developmental delays.

Age. Of the 25 children who were enrolled for any period of time in the Project, the mean age at time of admission was 18.9 months, with a range of 7 months to 33 months (median age = 22 months and a bi-modal distribution with modes of 22 months and 23 months). Table 4 presents a distribution of the participants' ages at time of enrollment.

Table 4
Age at Admission (n=25)

Age at Admission	Percent
7 to 12 months	28%
13 to 18 months	20%
19 to 24 months	28%
25 to 30 months	16%
31 to 36 months	8%

Birth Order. Of the 24 children for whom birth order information was available, 37.5% were the first-born in the family, with 33% being the only child and 4% were the first-born of two children. The majority of the participants (58%) were the last born child in the family, with 46% being the second of two children and 12% being the fourth of four children. From these data, we can see that only 8% of the families had another child following the birth of their handicapped child.

Handicapping Conditions. The diagnosis of the children prior to their enrollment in the Project are presented in Table 5. Table 6 presents the etiologies of the Project's children. Finally, Table 7 presents the APGAR ratings for the children.

Table 5

Diagnosis at Time of Enrollment
(n=25)

Observation	Percentage of Participants *
Unspecified Mental Retardation	56
Severe Mental Retardation	32
Profound Mental Retardation	12
Cerebral Palsy	48
Spastic	28
Microcephaly	8
Seizure disorder	40
Spina Bifida	4
Conductive Hearing Loss (suspected or chronic)	20
Hydrocephaly	12
Retinal damage/other vision	28
Paraplegic	4
Hypotonia	16
Hypertonicity	16
Other Motor	36
Epilepsy	8

* Total will be higher than 100% because children had multiple disabilities

Table 6

Etiologies of Participants

Observation	Percentage of Participants *
Herpes simplex	8
CMV	4
Prematurity	20
Failure to Grow	4
Asphyxia	20
Hyaline Membrane	12
Meningitis	8
Respiratory Distress Syndrome	8
Stroke	4
Unknown	20
Others	16

* Total will be higher than 100% because children had multiple etiologies

Table 7

APGAR Ratings

(n=8)

At Birth	At 5 Minutes
1	3
4	8
4	8
1	NA
2	3
8	8
1	3
5	6

Enrollment Period. Using May, 1988 as the cut-off date, children were enrolled in the Charlotte Circle Project for an average of 10 months. Children left the program either because they aged-out, died, or their parents moved. The distribution of the children's enrollment periods is presented in Table 8.

Table 8

Distribution of Enrollment Periods
(n=20)

Months Enrolled	Percentage of Students
1 - 6 months	40
7 - 12 months	30
13 - 18 months	10
19 - 24 months	20

PROJECT IMPLEMENTATION

In order to clearly articulate and describe the Project's implementation, this section presents the goals and objectives of the Project and the Project's responses to those goals and objectives.

1.0 Services for Children

The Project classroom opened its doors during the second quarter of the first Project year (November 19, 1985). Construction delays on an addition to St. Mark's Center necessitated a search for a temporary location for the Project classroom. Space was rented at St. Luke's Center for the Project's classroom and two other preschool classrooms for handicapped children (ages 3-5 years). Together, these classrooms were referred to as the "St. Mark's Center's Preschool Expansion Satellite". Appropriate day care licenses were obtained by St. Mark's Center. The Project's demonstration class moved to the St. Mark's facility during the second 6 Project months.

During its 3 year funding, the Project enrolled 25 children. Descriptions of these children and their families are provided in the Population Description section above.

1.1 Case Finding and Admissions

Project staff established contacts with public and private agencies, including hospitals, social services, physicians, and mental retardation facilities, during the first 6 Project months in order to alert the community to the unique services provided by the Project. News releases to the media were distributed

during the first 6 Project months. Files and a d-base were designed and implemented. Six children were enrolled in the Project during the first 6 Project months.

1.2 Assessment

During the first 6 Project months, initial assessment activities were developed to include a psychomotor evaluation by St. Mark's Director of Occupational Therapy; the Developmental Activities Screening Inventory administered by the Project's teachers or graduate assistants; and medical review by Dr. Joel Fischer, medical consultant to the Project.

1.3 Individual Education Plans

Prototypical IEPs were developed during the first 6 Project months. Individual goals and objectives, emphasizing social reciprocity, and daily data collection strategies were implemented throughout the life of the Project.

1.4 Exit Criteria

Exit criteria were developed during the 9th-15th Project months. While most children would leave the Project at the time of their third birthday, exit criteria needed to be developed to respond to special circumstances. Three exit paths were identified and exit criteria specific to each were developed. These include: (a) Graduation - at age 32 months an exit evaluation is conducted, Project staff need to discuss possible future placements, and Project teachers work with families to explore community alternatives; (b) Inappropriate Placement - if, as a result of progress evaluations, a child demonstrates sufficient growth so they no longer function in the severe range

of mental retardation and continued placement in the Project is judged to be inappropriate, alternative placement within the community will be sought by Project staff and families while the child continues to receive Project services until an alternative placement is found; and (c) Non-Participation - if lack of participation becomes an area of concern, a staff meeting will be held to discuss problem-solving strategies (e.g., conferences, home visits, behavioral contracts), with a placement committee action being requested as a last resort.

1.5 Curriculum Development

Curriculum development activities during the first 6 Project months included locating, becoming familiar with, and implementing appropriate available materials. Development of original curricula began during the second 6 Project months. Materials identified for use during the first 6 Project months included: Infant Massage for Developmentally Delayed Babies (UCP of Denver); Transactional Intervention Program (HCEEP Model Demonstration Project by Mahoney & Powell [1984]); A Stimulation Program for Young Sensory-Impaired, Multihandicapped Children (Safford, Gregg, Schneider, & Sewell, 1976); and Body Awareness, Contact, Communication: A Program of Development for the Severely and Profoundly Handicapped (Knill, 1985).

During the second Project year, the Body Awareness, Communication, and Contact Activity Program (Knill & Knill, 1986) was selected to replace the former body awareness program. The Charlotte Circle Curriculum Guide was begun during the second Project year and completed early in the third Project year.

2.0 Services for Parents

Direct Project services to parents began during the first 6 Project months. These included weekly home visits for each family and a weekly parent-child day held in the Project's demonstration classroom. During the second Project year, home visits were scheduled for once a month, rather than weekly. This change was prompted by an increase in enrollment in the Project's class to 10 children at any given time. During the second and third Project years, the objectives of the home visits solidified and included joint planning for children's goals, sharing information with parents and other family members (including grandparents, siblings, and babysitters), and to provide instructions and support in areas of need identified by parents. To facilitate agenda setting, Project staff began to use the Parents "Help Wanted" Questionnaire developed by the D. C. Society for Crippled Children.

Also, during the second and third Project years, special parent events were held. These included a stress management workshop (with follow-up consultation), group social educational breakfasts to demonstrate various facets of the program, and parent-child days in the Project classroom. The parent-child days often centered around holiday themes (e.g., face-painting at Halloween).

2.1 Needs Assessment

Individual interviews were held with each family during the first 6 Project months. Data were analyzed using an emergent design methodology.

2.2 Assessment of Progress

The following instruments were selected during the first 6 Project months to identify parent concerns and to measure parent progress: Greenspan-Lieberman Observation System for Assessment of Caregiver-Infant Interaction During Semi-Structured Play (Greenspan & Lieberman, 1980); and Teaching Skills Inventory: A Measure of Parent Performance(Rosenberg, Robinson, & Beckman, 1984).

3.0 Staff Development

Project staff met weekly to share information, receive training, and make decisions about admissions, assessment, IEPs, curriculum, transportation, and parent meetings. Instructional staff increased their involvement in appropriate professional organizations by joining the North Carolina Association for Infants and Families, The Association for Persons with Severe Handicaps, and the Division for Early Childhood/Council for Exceptional Children during the first 6 project months.

All Project Staff participated in the Comprehensive Program Review conducted by Dr. Joicey Hurth, TADS Consultant, on October 29-30, 1985. In addition, Dr. Calhoun (Project Director) and Mr. Leigh Derby (Executive Director of St. Mark's Center) attended the HCEEP Orientation meeting in Washington, DC, September 9-12, 1985. The Project's lead teacher visited two HCEEP Model Demonstration projects (Project SPICE in Milwaukee and Project LETS in Chicago) to gain information about classroom management and intervention strategies. These topics included

transportation arrangements, daily routines, feeding programs, medical management, and curriculum for infants with severe/profound handicaps. This technical assistance was arranged and coordinated by TADS.

Staff development activities during the second and third Project years include monthly meetings of all Project staff, weekly meetings of the Project Director and the Project's instructional staff, and the formation of special Project task forces to address issues of concern, including the establishment of visitor policies, procedures clarifying the role of the demonstration teacher within the general St. Mark's context, and developing classroom health and hygiene protocols. Most staff members participated in presentations at state or national conferences and attended those and other conferences. The Project Director and demonstration teacher participated in a management training seminar, "How to get results with people", sponsored by TADS. TADS also arranged for telephone consultations with other demonstration teachers to help develop and refine classroom policies and procedures.

4.0 Administration/Management

4.1 Quarterly internal management documents, including objectives, timelines, and designated Project personnel, were developed throughout the life of the Project.

4.2 Informed consent procedures were developed and reviewed individually by the University of North Carolina at Charlotte's (UNCC) and St. Mark's Center's Human Subjects committees during the first 6 Project months.

4.3 During the first 6 Project months, St. Mark's Family Services staff developed a directory of community services for families whose children did not qualify for the Charlotte Circle Project.

4.4 Procedures were developed during the first 3 Project months to expend funds, account for expenditures, initiate budget changes, and purchase necessary supplies and materials.

4.5 The Project's initial evaluation plan was developed during the first 6 Project months. D-base files were created for each child and family in the Project. Videotaping of parent-child interactions began during the second 6 Project months. A prototype of the data collection coding system was developed during the first 6 Project months.

During the second and third Project years, applied research activities to describe key behaviors related to social reciprocity and to investigate the effects of specific social reciprocity interventions were begun. A further description of these studies and their findings are described in the Project Outcome section below.

4.6 The Project Advisory Board was selected and met for the first time on October 29, 1985. Quarterly meetings were held throughout the life of the Project.

4.7 Transportation plans were developed during the first 6 project months. Transportation via a specially modified van obtained through a lease agreement began during the second 6 Project months. Transportation plans were modified as needed to meet individual needs throughout the life of the Project.

5.0 Secure Continuation Funding

During the third Project year, the Project staff, Project Advisory Board, and the staff of St. Mark's Center initiated an intensive campaign to secure continuation funding from the Mecklenburg County Commission. The Advisory Board and the St. Mark's staff provided excellent leadership in these activities. In general, the steps involved the development of a budgetary "betterment request" for St. Mark's Center that was included as an addendum to their annual budget request. This betterment request was approved by the local mental health agency and, subsequently, the county's human services advisory board. In both cases, the Circle betterment request was rated as a top priority for new funds. In a year in which a number of politically sensitive and popular betterment requests were forwarded to the County Commission, an intensive "political awareness" campaign was begun that involved the Advisory Board, Project parents, and other local individuals. County commissioners were invited to visit the demonstration class, received information describing the program and the cost benefit to society for continuing the program, and received a number of letters from parents and other interested parties describing the benefits of the program and their support for its continued funding. In its June meeting, a delegation of Project parents, staff, Advisory Board members, and St. Mark's staff were present at the county commission meeting at which continuation funding for the Project was unanimously approved by the County Commission.

Teacher's Classroom Activities/Responsibilities

One way to evaluate the implementation of the Project was to evaluate the degree to which the Project's instructional staff differentially spent their time while in the Project's classroom. Specific questions that relate to Project implementation that may be answered by these data include: (a) What proporation of time is spent on each activity in the classroom?; (b) What proportion of this time is spent on activities that were grant-related v. those that were inherent in the instructional process for the students?; and (c) To what degree may we expect these differential proportions of time to generalize to other, similar programs?

In order to arrive at answers to the above questions, a Circle Project Survey of Classroom Activities/Responsibilities was developed by the Project staff. This survey, relying on self-report data, was developed by reviewing the teaching and related behaviors and activities that were suggested by the objectives of the Project and by soliciting input from the Project's demonstration teachers to verify the inclusiveness of the items included on the survey.

The results of this survey indicated that few teacher-activities were solely a function of grant-related expectations and that these activities accounted for only a small proporation of the teachers' work week. Specifically, these grant-related activities and the average amount of time engaged in each activity per week included: (a) Consulting with UNCC Project personnel averaged 1.5 hours per week per teacher; (b) Interaction with Visitors averaged less than 1 hour per week per teacher; and (c) Participating in Research averaged 1 hour per week per teacher.

Other teaching and related activities may be identified as those that are inherent in any other similar program. These findings are presented in Table 9.

Table 9

Average Number of Hours Per Week Spent in Specific Teaching Activities by Project Teachers

Activity	Average Number of Hours/Week per Activity per Teacher
Parent/Family Related:	
Developing Skills in Parents	2.5
Home Visits	2.5
Planning/Delivering Instruction:	
Planning Daily Activities	4.5
Individualized Instruction Toward IEP Objectives	4.0
Sensory Stimulation	1.5
Music Therapy	1.0
Infant Massage	2.5
Staff Meetings	2.5
Evaluation of Child Progress:	
Recording Behavioral Data	2.0
Collecting/Managing Child Progress Data	4.5
Updating IEP/Computer Time	2.0

(Table Continues)

Other Therapies:	
Physical Therapy	<1.0
Occupational Therapy	3.5
Speech/Language Therapy	3.0
Other Child Centered Activities:	
Free Play	3.5
Feeding	6.0
Dressing or Diaper Change	2.5

Given a maximum of 20 hours per week of instructional time per child, we may see in Table 9 that the teachers devoted a significant proportion of their time to delivering instruction and other child centered activities. The time they spent engaged in providing other therapies was under the guidance of certified therapists. Evaluating child progress and parent-related activities were major areas of endeavor that typically occurred during times when children were not present in the classroom. These activities are likely to generalize to other, similar programs. The proportion of time spent in each activity is probably representative, but may vary according to local demands.

PROJECT OUTCOME

The presentation and interpretation of changes in children's standardized test scores requires more than the mere computation of "gain scores", as determined by subtracting the posttest score from the pretest score, because of a number of methodological considerations (e.g., handicapping conditions, severity levels, or data collection procedures). These considerations are especially germane for the Charlotte Circle Project, because of the age and

severe disabilities of the Project's students. Few standardized measures are available for use with this population and many of those that are available are more pyschologically, rather than educationally, oriented. But, regardless of the potential difficulties involved, two questions that are integral to evaluating program effectiveness along the dimenstion of child change must be answered in ways that allow generalization of those results. First, how much gain is sufficient in order to conclude that an intervention program was effective? Second, how much gain may have been expected in the absence of any intervention? The following section attempts to provide answers to these and related questions.

Testing Procedures

Systematic standardized testing of the Project's students was begun in January, 1986 using the Developmental Activities Screening Inventory-II (DASI) (Fewell & Langley, 1984). The DASI yields Raw Scores, a measure of performance of specific behaviors (e.g., smiles to physical contact, swipes at toy), Developmental Age, analogous to mental age, and Developmental Quotient, analogous to intelligence quotient.

Children were tested first within one month of their enrollment in the Project and again within eight to nine months. All children who aged-out of the Project at 36 months were tested again. The mean interval between pre- and posttest administrations was 7.6 months (median interval = 4.5 months), due mainly to the varying ages at which students entered the program. The DASI was administered by either the Demonstration Teacher on a trained graduate student in special education.

Reliability of the DASI. Interrater reliability and test-retest reliability of the DASI was determined in a separate study conducted by the Project staff (Rose, Calhoun, Prendergast, Armstrong, and Ladage, 1989). The purpose of this study was to determine the reliability of the DASI for use with a population similar to the Project's and to verify that the data collected for Project evaluation purposes were reliable measures. A sample of 13 current and former Project students was drawn, who then were administered the DASI at a two-week interval. These data were not used in the evaluation of child change to be discussed below. Results yielded the following correlation coefficients: (a) Interrater Reliability for first administration - Raw Score = .95 (p = .001), Developmental Age = .95 (p = .001), Developmental Quotient = 1.0 (p = < .001); (b) Interrater Reliability for second administration - Raw Score = .99 (p = <.001), Developmental Age = .99 (p = <.001), Developmental Quotient = .99 (p = <.001); (c) Test-Retest Reliability for Rater 1 - Raw Score = .90 (p = .002), Developmental Age = .90 (p = <.002), Developmental Quotient = .93 (p = .002); and (d) Test-Retest Reliability for Rater 2 - Raw Score = .82 (p = <.005), Developmental Age = .82 (p = <.005), Developmental Quotient = .94 (p = <.002).

Child Change

Pre To Posttest Scores. Table 10 shows mean pre-, posttest scores, difference, and resulting t-test statistics for the 19 children having pre- and posttest DASI scores. These children were an average of 20.7 months old (standard deviation [SD] 7.5) at pretest and 28.3 months old (SD 8.1) at posttest.

TABLE 10

Summary Pre-Posttest DASI Measures

	Pre		Post			
Variable	Mean	SD	Mean	SD	Difference	p value
Raw Score	10.9	5.7	15.5	7.6	4.6	.001
Developmental Age	5.6	3.6	9.5	6.1	5.9	.002
Develop. Quotient	29.1	14.9	32.6	23.0	3.5	.09

These data indicate that these 19 students gained an average of 4.6 items on Raw Score, an average of 5.9 months in Developmental Age, and an average of 3.5 points in Developmental Quotient over a median interval between pre- and posttests of only 4.5 months (mean interval = 7.6 months). The Raw Score difference may be interpreted to mean that the Project's students increased their performance on specific skills, as measured by the DASI, by 42%. Gains on the Developmental Age scale indicated a gain of 70% and gains on the Developmental Quotient scale indicated a 12% improvement.

Proportional Change. The Proportional Change Index (PCI) results in a ratio of developmental rate while the child is in the program to developmental rate predicted by the pretest (Wolery, 1983). The formula for calculation is: PCI = (Posttest Developmental Age (DA) - Pretest DA/Time in Program) / (Pretest DA/Pretest CA). For example, if the resulting PCI were 2.0, then development accelerated two times its previous rate. While the PCI is becoming more highly regarded because it seems to separate the effects of maturity and intervention more accurately than previously suggested formulae (e.g., the

Intervention Efficiency Index [Bagnato & Neisworth, 1980]), there are no established standards for interpreting the calculated values of the PCI.

When the data from the 19 Project students were used to calculate the PCI, results yielded PCI = 1.96. These data indicate that the Project's students' developmental rate accelerated an average of almost twice the expected developmental rate.

Effect Size. Effect Size, a measure used in meta analysis procedures, (Glass, McGraw, & Smith, 1981; Rosenthal, 1984) is beginning to become a popular method to evaluate compensatory and remedial education programs. The Effect Size (ES) is essentially a z score that is analogous to a standard deviation, but may be used to compare scores on two or more different measures. White, Casto, and Associates (1983) at the Utah State University Early Intervention Research Institute are using meta analysis procedures to evaluatge the effects of early intervention as documented in over 1,700 studies.

Calculation of the ES requires dividing the mean difference (gain) in scores by the groups' standard deviation. The formula, ES = (post DA - pre DA) / pretest DA standard deviation, results in a ratio of gain to group variation. An effect size of .25 to .33 is interpreted as indicating positive program impact, while an ES of .38 has been suggested as representing an important and clinically significant effect (White, et al., 1983).

There are several drawbacks to using ES that may be significant when using ES to evaluatge the data from the Charlotte Circle Project. One involves the use of the standard deviation because a heterogenous group (more variable) will have a larger divisor, which will require a

much larger gain figure to result in large effect sizes. The Project's students are just such a hetereogenous group, in terms of disabilities and as evidenced by a relatively large standard deviation on the pretest developmental age measure. Two, the ES appears to be sensitive to the length of intervention. Longer intervention periods can result in higher ES (Kovach & Kjerland, 1986). The Project's mean pre- posttest interval was 7.6 months.

Some standards for comparison are being derived from the meta analysis research being conducted by White, Casto, and their associates. Data that appear germane to the current report indicate:

- Early intervention programs for handicapped children ES = 0.56
- Early intervention when the program had high curriculum structures ES = 0.47.

Calculations, using the DASI developmental age scores described above, resulted in an ES of 1.11 for Charlotte Circle Project. This Effect Size is considerably larger than those standards suggested by the Utah State University Early Intervention Research Institute.

Separating Maturity and Intervention Effects. An important question for any early intervention program asks what gains may have occurred without any intervention. In other words, can we separate maturation-related gains from intervention-related gains? Irwin and Wong (1974) developed a method, the Age-Compensated Score (ACS), to answer this question. The ACS assumes a linear rate of development based on the child's pretest rate. However, the developmental rate of a handicapped child is often not linear and, thus, cannot be predicted with certainty. Rather, a curvilinear rate of development should be expected, because the developmental rate of a child who functions

below expectations will typically decline over time (Irwin & Wong, 1974). Consequently, predictions based on pre-developmental scores will probably be conservative for most children with disabilities, especially young children with severe disabilities.

The ACS formula results in a mathematically adjusted maturation-free posttest score: ACS = post DA - [(post CA - pre CA) x (pre DA/pre CA)]. The results of this computation, the mean ACS, and the pretest DA score can be compared statistically to determine intervention-related effect. Resulting p values refer to the probability of achieving the obtained maturation-free, intervention-related score differences.

Table 11 presents pre- and adjusted (ACS) post score differences for Developmental Age, as measured by the DASI, for the 19 Project children.

Table 11

Pre-Post Developmental Age Differences

Using Adjusted Posttest Scores

Pre		ACS		Mean		t	
Mean	SD	Mean	SD	Difference	SD	value	p
5.6	3.6	7.2	4.6	1.6	3.3	2.1(18df)	<.05

The data presented in Table 11 indicate that even though most gain may be attributed to predictable maturation (unadjusted DA gain = 5.9 months), the comparison of pretest DA to maturity-free posttest scores resulted in a statistically significant difference. Thus, the benefit as a result of the Charlotte Circle Project's interventions was 1.6 months developmental gain during an average pre-posttest interval of 7.6 months.

By using the logic of a comparison of the relative contributions of maturation and intervention (i.e., that pre to posttest differences are comprised of a certain proportion that can be attributed to maturation and the proportion that cannot be attributed to maturation can be considered intervention-related effects), we can compute the proportion of intervention-related effects by using the following formula: Intervention-Related Effects (%) = Intervention-Related Gain/Whole Gain x 100. Thus, the Intervention-Related Effects, for DA as measured by the DASI, of the Charlotte Circle Project = 1.6/5.9 x 100 = 27.1%. As a result of these calculations, we may conclude that 27.1% of the gain in Developmental Age by the Project's students can be attributed to the Project's interventions rather than to predicted maturation.

Finally, we must remember that these intervention-related data are probably rather conservative, due to the assumptions made regarding the linear development of young children with severe disabilities. Recall that these assumptions probably do not describe adequately the actual development of this population. Consequently, a higher, but unidentifiable, proportion of the gain in DA was probably attributed to maturation than was justified.

Instructional Effectiveness

One measure of instructional effectiveness, child change, was discussed above. Another measure is the rate of success with which instructional objectives from each student's IEP have been met. Data from the Project's classroom teachers indicate that 72% of the individual objectives were met successfully, a remarkable success rate given the seriousness of the handicaps of the Project's students.

Post Circle Placements

If the Circle Project is effective in its educational mission, it would be reasonable to expect the "graduates" of the project to be placed in pre-school settings that are less restrictive than those they would have attended had they not been enrolled in the Circle Project. Students with such severe handicapping conditions would enroll in St. Mark's Center for their pre-school programs, because they would not be eligible for any other pre-school program in Mecklenburg County.

As of the May, 1988 cut-off, fifteen children have exited the Project's program. These children left the program for one of four reasons: (a) reached their third birthday and aged-out (or "graduated"), (b) family moved, (c) prolonged illness, or (d) death. Table 12 presents a distribution of these children and their subsequent educational placements, when known or appropriate.

Table 12

Distribution of Students Exiting the Project

(n=15)

Reason for Leaving	Percent	Subsequent LRE	Subsequent Same RE	Subsequent Unknown
Died (n=2)	13%	--	--	--
Prolonged illness (n=1)	7%	--	--	--
Moved (n=3)	20%	--	--	100%*
Aged-Out (n=9)	60%	56%*	44%*	0

* Percentages based on proportion of students in a given row.

As may be seen in Table 12, the families of three children moved. Each of these families left no forwarding address. Attempts to contact them have been unsuccessful. Tragically, two of the Project's students died during the last two Project years and one child was so ill that his parents required to keep him at home. On a brighter note, the hypothesis that the success of the Circle Project can be determined, in part, by the subsequent placements of the Project's students seems to be supported. Five of the nine students, for whom information about subsequent placement was available, are currently receiving educational and therapeutic services in less restrictive educational settings. Two students are placed in the Claudia Belk Center, a mainstreamed pre-school and daycare center in which 90% of the students are non-handicapped. The other three students are placed in pre-school programs that provide services to children classified as moderately handicapped. The remaining four Project "graduates" are receiving pre-school services at St. Mark's Center.

Consumer Satisfaction

Parents of the Project's students were interviewed using naturalistic inquiry methods (Guba, 1981), to investigate the concerns of parents as they explored early intervention services for their child and their attitudes toward the Project after their child was enrolled (Calhoun, Calhoun, & Rose, in press). The results of this study indicate that parents had significant worries in making the decision to enroll their very young child in a program outside the home. These worries included: (a) being forced to acknowledge the child's developmental difficulties, (b) worries about the child's health and safety, (c) the sense that a baby is not ready for a school

program, and (d) since institutionalization had already been rejected by these parents, a center-based program was initially perceived as a form of institutionalization. These worries, plus advice from physicians to "wait and see" influenced 80% of the families to delay or decline early intervention enrollment.

Once enrollment was accomplished, clear benefits were perceived and parents regretted delaying participation. Participation in the Circle Project was seen as helpful in a variety of ways: (a) providing more intense intervention for the children, (b) allowing for greater normalization of family life, (c) providing emotional relief to parents, and (d) producing significant developmental gains for their child. Enrollment also led parents to experience an increased sense of control over their difficult situation because they had taken action that they viewed as useful to them and to their child. Enrollment in the Circle Project freed parents to engage in pleasant events with their child because of what is seen as the therapeutic impact of the program, for example, "I know he's had physical therapy and other experiences at Circle, so that removes my guilt if I want to take him on a stroll".

Finally, when comparing the Circle Project's center-based program to previous experiences with home-based programs, it was apparent that a home-based program was seen as very helpful for persons not yet ready to manage the perceived demands of a school program, for example "In the home-based program, somebody comes to your house...you know you don't have to go out in public". However, the parents also indicated a desire for more intensive intervention which is available in the Circle Project, "I was frustrated by the home-program. I

wished there was more training. Someone came over every two or three weeks and told us what he wasn't doing. It was frustrating that she didn't see what he was doing." Further, they expressed the view that a home-based program may place some difficult demands on the parent (e.g., to function as a therapist) while a center-based program offers the advantages of some respite and shared responsibilities: "I was the only one doing therapy in the home-based program. I was exhausted trying to be the mother and the therapist." (The reader should remember, when considering the above data, that they indicate a need for more intensive services for those parents of children with the most severe handicapping conditions. Rather than arguing in favor of either home-based or center-based programs, these data argue convincingly for a continuum of services for handicapped children in any community.)

Parent Survey. A parent satisfaction survey was developed by the Project staff to determine the degree of satisfaction with the various aspects of the Project. Surveys were mailed to 24 families. A follow-up mailing was conducted one month after the initial mailing. Three surveys were returned by the post office because the families had moved and left no forwarding address or the forwarding order had expired. Follow-up to St. Mark's Center to obtain more current addresses were found in the students' files. Fifteen usable survey were returned (71% of the potential usable responses). Table 13 presents the results regarding social/familial variables. Social reciprocity goals are especially reflected in the first nine items presented in Table 13.

Table 13

Circle Project Parent Satisfaction Responses
in Descending Mean Ranking of Value

Items	Value	Response Frequency	Mean
Since enrolling my child in the Circle Project:			
Child's Responsiveness to Parent			
Has decreased	1	0	
About the same	2	0	3.0
Has increased	3	15	
Feeling Responsive To Child's Needs			
Less responsive	1	0	
About the same	2	3	2.8
More responsive	3	12	
Parenting			
Is less rewarding	1	0	
Rewards are about the same	2	3	2.8
Is more rewarding	3	12	
Routine Caregiving (e.g., handling, feeding)			
Is more difficult	1	0	
Is about the same	2	3	2.8
Is easier	3	12	
Ability to Deal with Reactions of Others To Child			
Am less able	1	0	
Has remained about the same	2	3	2.8
Am more able	3	12	

(Table Continues)

Feelings of Parental Adequacy:			
Less adequate	1	0	
About the same	2	5	2.7
More adequate	3	10	
Family Life			
Seems less normal than before	1	0	
Seems about the same	2	4	2.7
Marital Stress			
Has increased	1	1	
Is about the same	2	4	2.6
Has decreased	3	9	
Parental Interaction and Play With Child			
Occurs less often	1	0	
Occurs about the same	2	7	2.5
Occurs more often	3	8	
Sibling Interactions and Play with Child			
Occurs less often than before	1	0	
Occurs about the same	2	6	2.4
Occurs more often than before	3	4	
No other children	0	5	
Parent Interactions With Siblings			
Spend Less "quality" time	1	1	
Spend about the same amount	2	4	2.4
Spend more "quality" time	3	5	
No other children	0	5	

(Table Continues)

Financial Pressures			
Seem greater	1	0	
Seems the same	2	9	2.4
Seems less	3	5	

As may be seen in Table 13, parents rated every items related to social reciprocity as very much improved since enrollment in the Charlotte Circle Project. The last three items (i.e., Sibling Interactions with Child, Parent Interactions with Siblings, and Financial Pressures) did not reflect specific goals of the Project, but were included as generalization measures. As such, the Project seemed successful in its attempts to provide socially reciprocal skills, although to a lesser extent than for the items reflecting more specific intervention focus.

Information regarding specific Project services was also obtained in the Parent Satisfaction Survey. These results are presented in Table 14.

Table 14

Parent Ratings of Circle Project Services

in Descending Mean Rankings of Value

Response

Items	Value	Frequency	Mean
Therapeutic intervention is provided.			
VERY important	1	15	
SOMEWHAT important	2	0	1.0
LESS important	3	0	

(Table Continues)

Intensive educational program is provided.			
VERY important	1	13	
SOMEWHAT important	2	1	1.1
LESS important	3	0	
Getting to share in the planning with my child's teacher.			
VERY important	1	14	
SOMEWHAT important	2	1	1.1
LESS important	3	0	
Parent-child days at the center			
VERY important	1	12	
SOMEWHAT important	2	2	1.2
LESS important	3	0	
Combines center-based and home-based program.			
VERY important	1	11	
SOMEWHAT important	2	4	1.3
LESS important	3	0	
Choice between 3-day and 5-day program			
VERY important	1	10	
SOMEWHAT important	2	4	1.4
LESS important	3	1	
Time off from responsibility of caring for my child's needs.			
VERY important	1	10	
SOMEWHAT important	2	3	1.5
LESS important	3	2	

(Table Continues)

Group meetings with other parents.			
VERY important	1	8	
SOMEWHAT important	2	5	1.6
LESS important	3	2	
Regular home visits by classroom staff.			
VERY important	1	7	
SOMEWHAT important	2	6	1.7
LESS important	3	2	
Transportation is provided			
VERY important	1	6	
SOMEWHAT important	2	2	2.0
LESS important	3	6	

As may be seen in Table 14, five items (i.e., Providing Therapeutic Interventions, Providing Intensive Education Programs, Participating in Planning, Parent-Child Days, and the Combined Center-based and Home-based Program) were consistently rated as Very Important or, to a lesser degree, Somewhat Important. No parent rated these services or program components as being Less Important. The choice between a 3-day and a 5-day program and respite were also highly rated services/components. Providing transportation received the lowest rating, with 6 parents indicating this service was Less Important. However, 6 parents also indicated that transportation services were Very Important. We may conclude that transportation services is probably more a function of individual need than a function of the programmatic offerings.

Cost Benefit Analysis

Regardless of the quality of the instructional program for very young children with severe disabilities, several socio-political factors may determine whether these programs are established or, if established, will continue to be funded. A major assumption about early intervention programs for infants with severe disabilities is that participation in these programs will improve the chances of the child's gaining from the compulsory education program. So, an implicit assumption is that, in the long term, these programs are cost effective. However, very little evidence is available to support this latter assumption (Takanishi & Feshbach, 1982). An argument against providing services to this population is the apparently high cost per child for these services. Typically, human service agencies have used the most rudimentary types of cost benefit analyses, including simple cost per child per year data (without projections of future costs or savings) and the number of activities completed given the project's costs. While these types of information are helpful, they are not sufficient for making a commitment of apparently large sums of money to any program. The true costs of any program are arrived at by comparing the costs of the program to the costs society would have to spend in the absence of the program. In other words, services will be provided to the parents and their children whether the early intervention program exists or not. The relative costs of these services, if the program is available vs. if the program is not available, will result in the actual costs to society for the program. Relevant questions regarding true educational costs include: (a) What costs are saved or returned to society as a result of the program's

existence; (b) What is the relative cost per student per year for the project and comparable programs?; (c) If the project is successful, some students may be placed in less restrictive educational setting for the remainder of their educational experiences. Then what are the relative costs of these differing levels of educational settings; and (d) What are the total costs of education at various levels of restrictiveness over the span of the student's educational career?

An innovative evaluation procedure, using various cost benefit analyses to arrive at a Net Value to Society was employed by the Charlotte Circle Project, primarily to convince local funding agencies that continuation of the Circle Project was a wise investment of public monies (Rose, Prendergast, & Calhoun, 1988). An excerpt of the cost benefit analysis section of the Year 2 evaluation report is presented below.

"In order to arrive at the Total Net Value to Society for each programmatic option, all costs are projected from a baseline of the child's first year being 1986, using 1986 dollars. The cost of the 'XXX' home-based program has been omitted as being a constant across all early intervention programs. Also, the programmatic path leading from no early intervention program to St. Mark's Pre-School to St. Mark's School-age programs which is considered the most likely educational placement for the children enrolled in the Circle Project if the Circle Project were not available, will be used as the constant to arrive at the Net Value to Society. These educational "routes" are presented in Table 15 in a most to least restrictive order.

TABLE 15

Net Value to Society Per Student For 1986 to 2006
by Setting Restrictiveness

Program Path	Cost	Constant	Net Value to Society
No Early > St. Mark's Pre- & School	$373,455	$373,455	0
Circle > St. Mark's Pre- & School	$411,930	$373,455	- $ 38,475
Circle > UCP Pre- > St. Mark's School	$400,047	$373,455	$ 26,592
Circle > St. Mark's Pre- Metro School-Age	$247,052	$373,455	+ $126,403
Circle > UCP Pre- > Metro School-Age	$235,169	$373,455	+ $138,286

"Although the Circle Project has been in existence for such a brief period that long term predictions of subsequent educational placements cannot be supported by data, the available data indicate that Circle graduates are likely to move from Circle to either St. Mark's or UCP's pre-schools. Following an optimal path, which may be accurate for a few children, in which a child attends UCP pre-school and then Metro Center, the savings to society over the course of hat child's educational life is projected to be $138,286. This is the money that is saved by society after funding the Circle class. A more likely route is for a child to move from Circle to St. Mark's pre-school and then to Metro for her school-age years, which will result in a savings to society of $126,403. Even if the second or third routes depicted in Table 15 are followed by a particular Circle graduate, the additional costs to society are only $38,475 or $26,592 respectively. Considering that these additional costs will be spread over a 20 year period, the additional cost per year per student is quite minimal".

Project Research Activities

To identify the key behaviors of young children with severe handicaps and their parents that contribute to improved social reciprocity, the Charlotte Circle Project has developed an observational coding strategy to analyze parent-child interactions (Spooner, Calhoun, & Rose, in press; Spooner & Rose, 1987). In an

investigation to identify behaviors that may be critical to socially reciprocal interactions, videotaped interactions of parents and children in a variety of settings were analyzed using sequential lag analysis, which is a nonparametric variation of auto- and cross-correlation time-series methods (Bakeman & Brown, 1977; Bakeman & Gottman, 1986). The computer program ELAG (Bakeman, 1983) was used for the sequential analysis, in which a selected behavior code becomes the criterion variable and probabilities of the remaining behavior codes (matching variables) occurring immediately subsequent to the criterion variable (Lag 1) are calculated (Bakeman & Gottman, 1986). Lags are defined as the number of sequential steps between subsequent events. For example, in the series of behaviors labeled ABC, calculations of the probabilities of B following A is Lag 1 and the probabilities of C following A with one intervening event is Lag 2. The matching frequencies at each lag are summed and the totals are used to compute conditional probabilities.

Key child behaviors were identified as smiling, interactions appropriate for the antecedent stimulus, orienting toward the parent (including postural orientation and eye gaze), and vocalizations. However, children rarely imitated their parents responses and almost 20% of their responses were comprised of crying and disengagement. Key parent behaviors were identified as vocalization, holding and touching the child, and initiating an activity purposefully. But, parents rarely smiled at their child and responded to their child's inappropriate interactive responses (e.g., crying and disengaging) in the same way as they responded to more facilitative interactive

responses (e.g., stroking, verbal responses, and other pleasant motor responses) (Rose, Spooner, & Calhoun, 1988).

In an attempt to socially validate (Wolf, 1978) the above findings, interviews were conducted with parents of young children with severe handicaps to evaluate the relative significance of the behaviors observed. Parent responses were audiotaped, transcribed, unitized, and categorized (cf. Guba & Lincoln, 1981). The following results were obtained:

When you are with child, what behaviors are pleasant, fun, or rewarding for you? In other words, what behaviors cause you to want to continue to interact with your child?

- child grins, laughs, or smiles;
- child imitates parent behavior; playfulness; anticipates parent's behavior;
- child attempts to communicate (both receptive and expressive), including cooing, singing, babbling, special sounds, and responds to verbal requests.

When you are with your child, what behaviors are difficult, stressful, or uncomfortable for you? In other words, what behaviors cause you to want to end an interaction with your child?

- child cries, does not want to be held, demonstrates poor soothability;
- child is passively non-responsive, "tunes out";
- child emits atypical motor responses (Calhoun, et al., in press).

These findings indicate that many of the child responses parents identified as favorable did not occur regularly, while several of the unfavorable child responses did occur at a relatively high frequency. These data also indicate that parents needed to receive training in differentially reinforcing those behaviors they viewed as contributing to a pleasant, high quality interaction and that they needed to receive training in emitting several responses at a higher frequency (e.g., smiling at their child).

Currently, research is underway at the Charlotte Circle Project to investigate the effects of several interventions on selected key behaviors that the above data indicate are critical to socially reciprocal interactions. Research topics currently under investigation include:

- turn taking for parents;
- imitative responses for children;
- verbal responses of children;
- eye contact and facial orientation for children.

Identifying stressful behaviors and developing interventions to reduce these behaviors were also a goal of the Charlotte Circle Project. Prolonged crying was identified by parents and the Project's instructional staff as one that was particularly disruptive and stressful. The staff of the Circle Project conducted a thorough literature review of infant crying (Calhoun & Rose, 1988c) and have implemented interventions in the demonstration classroom based on the findings of that review.

Interventions continue to be developed and implemented by the Charlotte Circle Project that are based on the preceding research as

well as on current research. These interventions are designed to increase the behaviors of children and parents that strengthen social reciprocity, to decrease those behaviors that parents find stressful, and to increase the parents' comfort in handling their special situation. These interventions are included in the Charlotte Circle Project Curriculum Guide along with other interventions that either have been investigated less formally or are derived from a synthesis of related research literature.

Dissemination Activities

The staff of the Charlotte Circle Project engaged in a number of activities designed to disseminate information about and findings of the Project to as wide an audience as possible. The following sections describe these activities.

Products Developed by the Circle Project. Several products have been developed and disseminated by the Project. These products are useful as descriptors of the Project, assist in replicating the Project, provide instructional activities based on the Social Reciprocity model, and provide assistance in evaluating similar projects.

Circle Project Working Papers - A series of 11 papers that discuss findings, practices, and procedures of the Circle Project in the following areas: direct service, parents' concerns, interventions, and data collection. These papers have been disseminated in presentations at state, national, and international conferences and in response to orders from readers of state and national organizations' newsletters (e.g., CEC Division for Early Childhood, Parent's Advocacy

Council, and the North Carolina Association for Retarded Citizens). As of the current date more than 1,000 copies of the various Working Papers have been disseminated nationally. An annotated bibliography of the Circle Project's Working Papers and a copy of the Project's order form may be found in Appendix A.

Charlotte Circle Project Curriculum Guide - A curriculum guide has been developed that emphasizes social reciprocity goals, especially for infants and young children in the age range birth-three years and their families. The Curriculum Guide is a supplementary, rather than comprehensive, that can be used as part of an early intervention program for young children with severe/profound handicaps, in addition to other therapeutic and educational interventions. The Guide can be used in a variety of settings, including home-based, center-based, and hospital programs. The social reciprocity goals are presented in general terms so they can be reviewed by multidisciplinary Individual Family Service Plan teams to determine the appropriateness of goals for individual children. Modifications are welcomed. The Guide's social reciprocity goals emphasize families and children's activities, while others focus more directly on parents. In all cases, the commonality is the desire to support the relationship between parents and their children and to improve the quality of their lives. Data collection strategies are provided for each goal area to assist in identifying needs and monitoring progress.

The Charlotte Circle Curriculum has been disseminated in presentations at national and international conferences, in staff development workshops, and in response to orders from readers of state and national organizations' newsletters. As of the current date more than 250 copies of the Curriculum Guide have been disseminated nationally. A copy of the Charlotte Circle Curriculum Guide may be found in Appendix B.

Circle Project Computer Programs - A number of computer programs have been developed by the staff of the Project in collaboration with staff of the University of North Carolina at Charlotte. These programs, listed below, are mainly for use in data collection analysis activities. They may be useful to other programs for observations of children's behavior, training observers, and other evaluative activities.

Spooner, F., & Alexander, B. (1986). Downloading from the Model 100 to cassette recorder: A simple way to maximize storage space [Computer program]. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, Charlotte Circle Project.

Spooner, F., Alexander, B., & Weakland, M.J. (1986). Transferring multiple files on the Radio Shack Model 100: Batch dumping [Computer program]. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, Charlotte Circle Project.

Spooner, F., & Davis, R. (1987a). Recoder: An alteration of previously coded data to match modified coding catalog [Computer program]. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, Charlotte Circle Project.

Spooner, F., & Davis, R. (1987b). ELAG prep part 1: A preparation of interaction data of multiple files for sequential lag analysis in BASIC [Computer program]. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, Charlotte Circle Project.

Spooner, F., & Davis, R. (1987c). Cedit: Simple alteration of Elag control files to accommodate Bakeman's optional analysis features [Computer program]. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, Charlotte Circle Project.

Spooner, F., & Harnyo, S. (1987a). Elag prep part 2: Determining unique codes for ELAG control file in dBASE [Computer program]. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, Charlotte Circle Project.

Spooner, F., & Harnyo, S. (1987b). Utilizing Bakeman's optional analysis features to chart ELAG data in Framework II: An application of the FRED language [Computer program]. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, Charlotte Circle Project.

Spooner, F., & Weakland, M.J. (1986a). Recoder: BASIC program to capture social reciprocity data on the Radio Shack Model 100 [Computer program]. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, Charlotte Circle Project. Spooner, F., & Weakland, M.J. (1986b). Reliability comparisons for inter and intra rater judgments with a built-in windowing feature for two files [Computer program]. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, Charlotte Circle Project.

Spooner, F., & Weakland, M.J. (1987a). Analyzer: Daily short-form analysis for social reciprocity data [Computer program]. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, Charlotte Circle Project.

Spooner, F., & Weakland, M.J. (1987b). Reliability for individual codes across multiple file comparisons: Allrel% [Computer program]. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, Charlotte Circle Project.

Publications. In order to disseminate Project information to a wider professional audience, several working papers and other manuscripts have been submitted for publication. As of the current date, the following list delineates those published papers.

Calhoun, M.L., & Rose, T. L. (1988). Strategies for managing and comforting crying in early intervention programs. Journal of the Division for Early Childhood, 12, 306-310.

Calhoun, M. L., & Rose, T. L. (1988). Early social reciprocity interventions with infants with severe retardation: Current findings and implications for the future. Education and Training of the Mentally Retarded, 23, 340-343.

Calhoun, M.L., & Rose, T. L. (1988). Social reciprocity: Early intervention emphasis for young children with severe/profound handicaps. Charlotte, NC: University of North Carolina at Charlotte, College of Education and Allied Professions, (ERIC Document Reproduction Service Number ED294362).

Calhoun, M. L., Calhoun, L. G., & Rose, T. L. (in press). Parents of babies with severe handicaps: Concerns about early intervention. Journal of the Division for Early Childhood.

Calhoun, M. L., & Rose, T. L. (in press). Special focus - Serving young children with severe handicaps: Promoting positive parent-child interactions. Teaching Exceptional Children.

Calhoun, M. L., & Rose, T. L., & Armstrong, C. (in press). Having fun in the community. Teaching Exceptional Children.

Rose, T. L., Calhoun, M. L., & Ladage, L. (in press). Helping young children respond to caregivers. Teaching Exceptional Children.

Spooner, F., Calhoun, M. L., & Rose, T. L. (in press). An observational coding strategy for the socially reciprocal interactions of infants with severe handicaps and their caregivers. Journal of Special Education Technology.

In addition, two other manuscripts have been submitted for publication, but editorial decisions have not been made as of this date.

Rose, T. L., Calhoun, M. L., Prendergast, D., Armstrong, C., & Ladage, L. (1989). Reliability of the Developmental Activities Screening Inventory. Manuscript submitted for publication.

Rose, T. L., Spooner, F., & Calhoun, M. L. (1988). Strengthening parent-child interactions: Identification of key behaviors. Manuscript submitted for publication.

Conference Presentations. In order to disseminate Project information as quickly as possible (avoiding publication delays) to a wider professional audience, the Project staff presented papers and workshops at a number of state, national, and regional conferences. As of the current date, the following list delineates these presentations.

INTERNATIONAL CONFERENCES

Calhoun, L.G., Calhoun, M. L., & Rose, T. L. (1987). Families of babies with severe handicaps: Concerns about early intervention. Paper presented at the annual convention of the American Psychological Association, New York.

Calhoun, M. L., & Rose, T. L. (1988). Promoting positive caregiver-infant interactions: Practices with promise. Paper presented at the annual international convention of the Council for Exceptional Children, Washington, D. C.

Calhoun, M. L., & Rose, T. L. (1988). Early social reciprocity interventions with infants with severe mental retardation: Current findings and implications for the future. Paper presented at the Emerging Challenges for the Future international conference of the Division of Mental Retardation of the Council for Exceptional Children, Honolulu, HI.

Calhoun, M. L., & Rose, T. L., Spooner, F., & Prendergast, D. (1986). The Charlotte Circle Project: Early intervention with a social reciprocity-emphasis. Paper presented at the annual conference of the Association for Persons with Severe Handicaps, San Francisco, CA.

Calhoun, M. L., Rose, T. L., Derby, L., Kairis, A., & Prichett, J. (1987). Early intervention with a social reciprocity emphasis: Issues and results. Tutorial presented at the annual international convention of the Council for Exceptional Children, Chicago.

Calhoun, M. L., Rose, T. L., Ladage, L., Spooner, F., & Straughn, S. (1987). Early intervention with a social reciprocity emphasis. Workshop presented at the annual conference of the Association for Persons with Severe Handicaps, Chicago.

Spooner, F., & Rose, T. L. (1987). Technologies for observation and reliability of early socially reciprocal interventions. Paper presented at the annual meeting of the Association for Behavior Analysis, Nashville, TN.

NATIONAL CONFERENCES

Calhoun, M. L., Rose, T. L., Spooner, F. & Prendergast, D. (1986). Social reciprocity interventions for young severely handicapped children. Paper presented at the National Early Childhood Conference on Children with Special Needs of the Division for Early Childhood of the Council for Exceptional Children, Louisville, KY.

STATE or REGIONAL CONFERENCES

Armstrong, C. (1988). The Charlotte Circle Project: Community services for the severely disabled infant. Paper presented at the Community Response to the Severely Disabled Infant conference of the Charlotte Area Health Education Center, Shelby, NC.

Calhoun, M. L., Prendergast, D., Hein, M., & Rose, T. L. (1986). Early intervention for young severely handicapped children. Symposium presented at the annual conference of the North Carolina Association for Infants and Families, Greenville, NC.

Staff Development Activities. A two-day staff development workshop was conducted in April, 1988 by the Project staff at the model site. The workshop, titled "Serving infants with a social reciprocity emphasis", was sponsored by the Technical Assistance Program-Intervention Network.

Other Dissemination Activities. Other, less formal, dissemination activities were conducted by the Project's staff. These include the following types of activities.

News Media - Two news releases were distributed, in collaboration with UNCC's Office of Public Information, that resulted in two articles about the Charlotte Circle Project that appeared in the Charlotte Observer. In addition, Project staff appeared on local radio and television shows to discuss the services available at the Circle Project.

Newsletters - Another news release was mailed to a number of local, state, and national newsletters of various interested organizations. This effort resulted in articles appearing in the newsletters of the following organizations: (a) nationally - the Division for Exceptional Children, (b) state - the Exceptional Child Advocacy Council, and (c) local - the Charlotte-Mecklenburg Council for Exceptional Children, the Mecklenburg-Union Counties Association for Retarded Citizens, and CRIER - the official publication of the Charlotte Junior League.

Public Service Presentations - Project staff made presentations regarding the Project to a variety of community organizations, including: the Charlotte Junior League, the Charlotte Rotary Club, and the nursing staff of the Neonatal Intensive Care Unit at Charlotte Memorial Hospital.

Public and Professional Awareness Activities - The Project's brochures were distributed to all public service agencies in Mecklenburg County, twice to all pediatricians in Mecklenburg and Union Counties, and to all branches of the Mecklenburg County Public Library.

Political Awareness Activities - Copies of the Project's brochures, the Project's Cost Benefit Analysis, and other materials describing the Project were mailed to every Mecklenburg County Commissioner during the final Project year. These activities were conducted in conjunction with the effort to ensure continuation funding for the Circle Project. In addition, the majority of the County Commissioners visited the St. Mark's Center to observe the Project's model demonstration classroom activities.

On-Site Visits - Visitors to the Project's demonstration class have included the following:

Charlotte Junior League Volunteer Placement Committee

Director and Coordinator of Project HAPPEN (HCEEP Model Demonstration Project)

Public Health nurses

Presbyterian Hospital nursing students

Project TEACCH consultant

Director and Therapist from the Center for Human Development's Parent-Infant Training Program

Director and Regional Director for the NC Division of Mental Health/Mental Retardation

Members of the Mecklenburg County Commission

Members of the Mecklenburg Quality Assurance Board

Members of the Mecklenburg County Human Services Council

Director of the United Cerebral Palsy Center

Education Committee of the Mecklenburg-Union Counties Association for Retarded Citizens

Director of Project SUNRISE

Representatives of the NC Department of Health and Human Resources

Director of the Human Development Center at Winthrop College (South Carolina)

Director of the Parent Infant Training Program of the Mecklenburg Center for Human Development

Representatives of Project TAP-IN, NC Department of Health and Human Resources

Representatives of the Charlotte Memorial Hospital's Neonatal Intensive Care Unit

Summary and Conclusions

Previous sections presented process and outcome data from the Charlotte Circle Project's Social Reciprocity model for early intervention. These data and measures of impact on children and families are summarized below. Subsequent to this summary, conclusions are drawn regarding the Project.

Summary

Twenty-eight families were referred to the Project over the three years of HCEEP funding, of whom 25 enrolled their children. The mean age for these 25 children at the time of admission was 18.9 months. Each child exhibited severe disabilities with multiple etiologies. Of the families, 64% were two-parent families, 28% were single-parents, and 8% were foster parents. Sixty percent of the families were white. Thirty-nine percent of the mothers and 14% of the fathers were not employed outside the home. Educational levels obtained by parents

were quite varied, ranging from 29% of the fathers not graduating from high school to post-graduate work or degrees. These data suggest that the model was responsive to a wide range of families who had young children with severe disabilities.

Data regarding the Project's implementation revealed that specific Project objectives were accomplished reliably in a timely fashion. Generalization of the model and instructional activities appear to be ensured by data indicating that only a small proportionate instructional staff-time was spent on grant-related activities, while the majority of staff-time was spent on instructional activities that would be required in other center-based/home-based programs.

Project outcome data indicated significant gains for Project students, as measured in a variety of ways to factor out normally expected developmental gains. Gains in performance of specific skills, as measured by the DASI Raw Score scale, were statistically significant at the .001 level. Gains in Developmental Age were statistically significant at the .002 level. Gains in Developmental Quotient were significant at the .09 level. Differences in pre-posttest scores indicated that the students gained an average of 4.6 items on the raw score (a 42% increase), an average gain of 3.5 points on Developmental Quotient (a 12% improvement). These gains were made over a median pre- posttest interval of only 4.5 months (mean interval = 7.6 months).

In order to control for normally occurring developmental gains, several additional analyses were performed. The Proportional Change Index, a ratio of developmental rate predicted by the pretest, yielded

data indicating that the Project students developmental rate accelerated at a rate of 1.96, or almost double the expected developmental rate.

Calculation of the Effect Size, a measure that results in a ratio of gain to group variation, found and effect size for the Project student's Developmental Age scores of 1.11. This effect Size is considerable larger than those suggested as being indicative of successful early intervention programs.

Use of the Age-Compensated Score formula results in a mathematically adjusted maturation-free posttest score. Data from the Project's students yielded an ACS that was statistically significant at the <.05 level. These data suggest that at least 27% of the gains in Developmental Age were as a result of the Project's interventions rather than to predicted maturation.

Post-Circle educational placements of the Project's graduates provide further evidence of the Project's success. Predicted preschool (age 3-5) placements for children with disabilities as severe as the Project's students typically would be for a relatively restrictive setting. However, 56% of the students who exited the Project to enroll in other educational settings were placed in more normalized, less restrictive settings.

The accumulation of these data suggest significant benefits that may be directly attributable to the Project. Parent satisfaction data support these interpretations of the data.

Conclusions

Professionals within the field of early childhood special education are currently engaged in much discussion and research

regarding a variety of important issues, including definitions, assessment, cognitive and behavioral correlates and characteristics, administrative and legal considerations, and service delivery, especially regarding least restrictive educational environments. The findings reported in this program evaluation support the concept of a full continuum of services being made available to families of young children with handicaps. While some may argue that only home-based or consultative programs are appropriately categorized as less restrictive, the data presented in the current report indicate that a center-based component may be quite appropriate for young children with severe disabilities because of the intensive instruction and related services available in a center-based program. If we can include subsequent placement in more normalized settings as a determining characteristic of an appropriate educational placement, then the persuasiveness of including center-based alternatives in any continuum of services is clear.

Other important service delivery model issues revolve around the quest for the most effective and efficient intervention models and curricula. An emphasis on socially reciprocal responses has been shown to be related to significant developmental gains in young children with severe handicaps. The current data indicate that both parents and children have moved toward a more normalized life as a result of the Project's focus on social reciprocity. We must continue to emphasize the educational and social significance of parent-child interactions. Interventions, such as those evolved from the social reciprocity model, that attempt to make these interactions more normal by increasing the quality, frequency, and duration of those

interactions may be quite likely to yield significant generalized gains in child skills because of the increased learning opportunities provided. While more research is required before claims of the validation of the social reciprocity model can be accepted with full confidence, the Charlotte Circle Project has contributed important initial data.

Questions regarding the feasibility of any externally funded project, specifically can such a project exist in a typical community without extra financial and supervisory assistance, must also be answered. Although the planning, initiation, demonstration, and program evaluation activities could probably have not been accomplished without external funding, the major program features of the Charlotte Circle Project can be implemented relatively easily in metropolitan areas. The Circle class has received local funding to continue services to the community. Implementation of important social reciprocity components seem feasible in less populous areas. While cost per child costs may seem high (i.e., approximately $11,000 per child per year), data regarding the net savings to society indicate that as much as $138,000, including the costs of the birth-3 program, across the school years of each child may be saved if the graduate of the Circle Project is subsequently placed in less restrictive educational settings providing services to less severely handicapped children (Rose, Prendergast, & Calhoun, 1988).

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Figure 1

CHARLOTTE CIRCLE PROJECT
SERVICES TO CHILDREN

RESOURCES	SERVICES	OUTCOMES
Classroom Team * 2 Special Education Teachers * 1 Certified Occupational Therapist Assistant * 1 Paraprofessional * Volunteers Consultants * 1 Speech Pathologist * 1 Registered Occupational Therapists * 1 Developmental Pediatrician * 1 Family Services Coordinator Management/Research Team * 1 Project Director * 1 Evaluation/Dissemination Coordinator * 2 Graduate Assistants	Center-Based Program Component: * 12-month classroom program * 3-day or 5-day a week options, based on parents' preference * Daily instructional schedule from 9 a.m. - 1 p.m. * Optional extended hours for day care * Daily schedule for intervention 9:00-9:20 Greeting. Diaper change. Handwashing. Small social groups 9:20- 10:00 Massage 10:00-10:40 Individual goals, with daily data collection 10:40-11:00 Music therapy and Sensory stimulation 11:00-12:15 Lunch. Therapeutic feeding programs	*Individualized family service plans, reflecting goals established through interdisciplinary evaluations and through family-centered assessment and goal-setting * Developmental progress, as monitored by daily data collection and quarterly up-dates of IFSP * Progress in social reciprocity, through classroom efforts and generalization to home environment * Referral to appropriate programs in least restrictive environment at third birthday

RESOURCES	SERVICES	OUTCOMES
<u>Facility</u> * Classroom facilities at St. Mark's Center, a modern, burden-free educational facility <u>Equipment</u> Prone standers & tables, scooter boards, tumbleform sider-lyers & chairs mats, straight-leg sitters, corner chairs, mirror of reflective paper, adaptive swings, bunked cribs, rocking chair, switch operated toys, infant toys <u>Curriculum</u> * Charlotte Circle Curriculum Guide * Carolina Curriculum for Handicapped Infants and Infants at Risk * Infant Massage Program * Body Awareness, Communication Contact Program	12:15-12:45 Social Play 1:00 p.m. Departure * Language and motor therapy integrated into daily routine * Transportation services for children who request it * Monthly home visits to each child and his/her family * Support for participation in normalized community activities	* Increased participation in the community

RESOURCES	SERVICES	OUTCOMES
Assessment Data * Multidisciplinary team evaluation from the Center for Human Development * Screening data from Carolina Curriculum Assessment Log and Developmental Activites Screening InventoryII * Daily data collection on target behaviors * Family-centered assessment and goal setting		
Transportation * Van		

Figure 2

CHARLOTTE CIRCLE PROJECT
SERVICES TO FAMILIES

RESOURCES	SERVICES	OUTCOMES
* Parent participation in design of program (days of week, hours) * Preassessment planning questionnaire * Parent "Help-Wanted" questionnaire * Staff facilitors, resource persons and materials	* Classroom-based intervention program for 3 or 5 days a week, which serves as a laboratory for social reciprocity interventions and provides daily respite for families. * Parent involvement (to degree desired) in evaluation and goal setting * Monthly home visits for joint planning of goals, sharing of important information, functional skills development * Quarterly Family Night Programs, for education, recreation, and support * Parent-Child days at St. Mark's Center	* Increased parent participation in vocational, educational and social activities. (12-20 hrs respite each week) * Individualized Family Service Plan, that reflects family values and goals * Increased family comfort and confidence in handling special routines; increased social reciprocity * Increased participation in community activities * Celebrations

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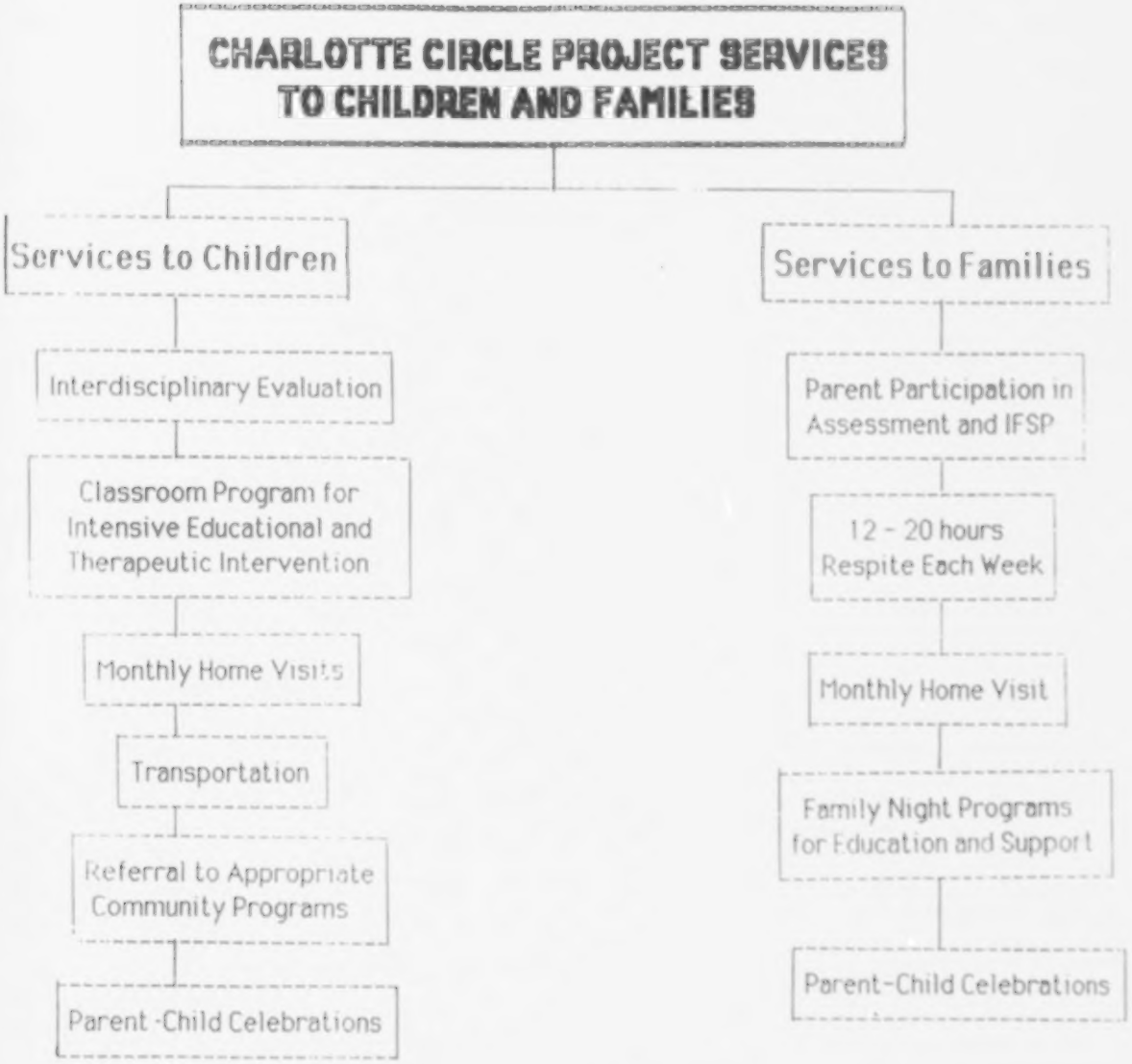
Figure 3


CHARLOTTE CIRCLE PROJECT SERVICES TO CHILDREN AND FAMILIES
Services to Children
Interdisciplinary Evaluation
Classroom Program for Intensive Educational and Therapeutic Intervention
Monthly Home Visits
Transportation
Referral to Appropriate Community Programs
Parent-Child Celebrations
Services to Families
Parent Participation in Assessment and IFSP
12 - 20 hours Respite Each Week
Monthly Home Visit
Family Night Programs for Education and Support
Parent-Child Celebrations